

**RESEARCH ARTICLE.....**

## Effect of different cooking procedures on microbiological quality of chevon meat balls

RICHA RAI, DEBASHIS BHATTACHARYYA, PRAVEEN KUMAR PRAVEEN, **SUBHA GANGULY**, NIRUPAMA DALAI AND SHASHANK SHEKHAR

**ABSTRACT.....** In this research, the effects of different cooking processes (pan fried and microwave cooking) on microbiological quality of the raw and cooked chevon meatballs were studied. Microbial flora of the raw meatballs was as follows: total plate count,  $5.98 \pm 0.235$  (log cfu/g); yeast and mould,  $4.80 \pm 0.328$  (log cfu/g); coliforms,  $3.05 \pm 0.433$  (log cfu/g). Highly significant ( $P < 0.01$ ) difference was noticed in microbiological quality of chevon meat balls. The cooking processes decreased the microbial flora approximately 2–3 log cycles, and pan frying was the effective cooking process for reducing microbial numbers compared to the microwave oven. The temperature of the Pan fried (150–160°C for 5–7 min) was higher than the microwave oven. To conclude, it was advised to use slightly higher temperatures than used in the microwave oven cooking procedures to increase microbial quality of the meat balls studied in this research.

**KEY WORDS.....** Pan fried, Microwave oven, Microbiological quality, Chevon meat balls

**HOW TO CITE THIS ARTICLE** - Rai, Richa, Bhattacharyya, Debasish, Praveen, Kumar Praveen, Ganguly, Subha, Dalai, Nirupama and Shekhar, Shashank (2016). Effect of different cooking procedures on microbiological quality of chevon meat balls. *Asian J. Animal Sci.*, **11**(1): 30-32 (DOI : 10.15740/HAS/TAJAS/11.1/30-32).

**ARTICLE CHRONICLE** - Received : 01.01.2016; Revised : 22.04.2016; Accepted : 15.05.2016

**INTRODUCTION.....**

Meat is an important livestock product. India possesses 125.73 million goats and produced 5, 44,000 Ton of chevon in 2008 (FAOSTAT, 2009). Chevon (goat meat) is most popular meat of ruminant species and is accepted by all communities in India. Cooking method is one of the major factors which determine meat palatability. Nearly all foods may be contaminated by micro-organisms to a certain extent. Cooking of meat is essential to achieve a palatable and safe product Tornberg (2005).

In general, heat (boiling, grilling and frying) is applied to meat in different ways to improve its hygienic quality by inactivation of pathogenic micro-organisms. (Bayhan *et al.*, 1990) reported that microbiological quality of the raw ground meat was poor, and the heating process was not enough to ensure the safe eating quality. The microbial quality is better during oven cooking than microwave cooking of chevon patties (Raj *et al.*, 2005). Heddleson and Doores (1994) stated that the microwave cooking with ovens of lower wattage (e.g. 450 W) was less effective in destroying bacteria compared to cooking with

ovens of higher temperature.

The present study was aimed to determine the microbiological quality characteristics of chevon meatballs, and to observe the effects of different cooking procedures on the microbiological quality of final products.

Rai *et al.* (2016a) studied on the influence of different cooking methods like pan fried (PF) and microwave cooking by baking (MO) methods on the proximate parameters (moisture, protein, fat and ash), pH, cooking yield, cooking losses and sensory quality of the raw (R) and cooked chevon meatballs. Significant ( $P<0.01$ ) difference was noticed in moisture content and raw meat was found to be highest moisture content than other cooked meat ball. Non-significant difference was found in protein and fat content of different cooking methods (PF and MO) as well as raw (R) meat. MO had higher protein content than PF due to more cooking losses during pan fried cooking. Whereas, higher fat content in PF than MO as after frying due to the incorporation of fat from oil. Highly significant difference in ash content of different cooking method (PF and MO) as well as in R meat was observed. Samples from different cooking methods contained more ash than raw meat balls and were higher after frying due to loss of water. On the basis of the above-mentioned data conclude that the method of cooking had considerable effect on the proximate composition. The moisture and protein were better in microwave cooked products. However, the sensory panelists graded higher scores for pan frying cooked meat ball than microwave cooking method.

## RESEARCH METHODS.....

Chevon was purchased from a local market of Kolkata. After manual deboning which was carried out at the Department of Livestock Products Technology, Faculty of Veterinary and Animal Sciences, WBUAFS, Belgachia, Kolkata meat was thoroughly screened for removing excess fat, tendon, etc. After adequate thawing in room temperature, meat was weighed, cut into small

chunks and placed in the meat mincer (Stadler Ltd.). After mincing meat was chopped in a bowl chopper (Stadler Ltd.) and the recipe was added for preparing emulsion. After preparing the emulsion the chevon balls were fried in the frying pan using refined sunflower oil at a temperature of 150-160°C for 5-7 min until internal temperature of 65°C was attained. In another method, the balls after preparing emulsion were cooked in microwave oven (Model GC 30 E 09 MRGX) at 'Bake' setting for 25 min. The internal temperature was  $70 \pm 2^\circ\text{C}$  at the geometric centre of the meat balls.

Total plate count, yeast and mould count and coliform count were determined following the standard method of APHA (1992).

## Statistical analysis :

All the data obtained during the present investigation were analyzed statistically to draw valid conclusion by using SPSS (version 10.0) software. The results were expressed in terms of mean and standard error (SE) of mean. The means were compared by one way ANOVA followed by Duncan's multiple range test at 5 per cent level of significance (Duncan, 1955).

## RESEARCH FINDINGS AND ANALYSIS.....

The data presented in the Table 1 revealed that there was highly significant ( $P<0.01$ ) difference in total plate count of chevon meat balls of different cooking method (PF and MO) as well as raw meat. Yeast and mold count of chevon meat ball was found to be highly significant ( $P<0.01$ ). The Yeast and mold colonies were not detected in PF group. Coliform found to be highly significant ( $P<0.01$ ). The coliform were not detected in PF and MO and reported only in R groups.

In general, cooking processes decreased the microbial flora approximately 2-3 log cycles, and pan frying was the effective cooking process for reducing microbial numbers compared to the microwave oven. These results are in agreement with the results of (Elmossalami *et al.*, 1990 and Yilmaz *et al.*, 2002).

**Table 1 : Colony Forming Units (microbiological quality) of chevon meat balls from different cooking methods**

Method of cooking	Total plate count (log cfu/g)	Yeast and mold (log cfu/g)	Coliform (log cfu/g)
Raw	5.98 $\pm$ 0.235 <sup>a</sup>	4.80 $\pm$ 0.328 <sup>a</sup>	3.05 $\pm$ 0.433
Microwave	2.43 $\pm$ 0.085 <sup>b</sup>	0.37 $\pm$ 0.236 <sup>b</sup>	ND
Pan fried	2.28 $\pm$ 0.057 <sup>b</sup>	ND	ND

Values expressed in Mean $\pm$ S.E; Means bearing different superscripts between row differ significantly ( $P< 0.05$ ) ND: Not detected

Different methods of cooking have considerable effect on the proximate composition and fatty acid composition of chevon meat balls. The microbiological quality should remain acceptable in all the cooked products. The moisture and protein content was better in microwave cooked products. Considering the fatty acid profile of different samples, microwave cooking is found to be the best cooking methods for healthy eating (Rai *et al.*, 2016b).

## Conclusion

The present study helped to conclude that the method of cooking had considerable effect on the physico-chemical properties of chevon meat balls. The microbiological quality remained acceptable in all the cooked products.

## Acknowledgement :

The authors are thankful to Hon'ble Vice-

Chancellor, West Bengal University of Animal and Fishery Sciences and the Dean, Faculty of Veterinary and Animal Sciences, Kolkata for providing the necessary facilities to conduct the research.

## COOPTED AUTHORS' –

**RICHA RAI AND DEBASHIS BHATTACHARYYA**, Department of Livestock Products Technology, Faculty of Veterinary and Animal Sciences, West Bengal University Animal and Fishery Sciences, KOLKATA (W.B.) INDIA

**PRAVEEN KUMAR PRAVEEN**, Department of Veterinary Public Health and Epidemiology, Faculty of Veterinary and Animal Sciences, West Bengal University Animal and Fishery Sciences, KOLKATA (W.B.) INDIA  
Email: drpraveenvet2005@gmail.com

**NIRUPAMA DALAI**, Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary and Animal Sciences, West Bengal University Animal and Fishery Sciences, KOLKATA (W.B.) INDIA

**SHASHANK SHEKHAR**, Department of Animal Genetics and Breeding, Faculty of Veterinary and Animal Sciences, West Bengal University Animal and Fishery Sciences, KOLKATA (W.B.) INDIA

## LITERATURE CITED.....

APHA (1992). *Compendium of methods for methods for the microbiological examination of foods*. 2nd Ed. (Ed.M.L.Speak). Am.Pub. Hlth. Assoc., Washington, D.C., U.S.A.

**Bayhan, A.**, Abbasoglu, U. and Yentur, G. (1990). Ankara'da tüketilen izgara köftelerin bakteriyolojik kalitesinin halk sagligi yönünden arastirilmasi , *Gida Tek. Der. Derg.*, **15** (4): 235-243

**Duncan, D.B.** (1955). Multiple range and multiple F-tests. *Biometrics*, **11**: 1- 42.

**Elmossalami, E.**, Roushdy, S. and Yassien, N. (1990). Improving the hygiene of locally manufactured meat products. *Fleisch Wirts Chaft*, **70** (3) : 299 : 300.

**Heddeson, R.A.** and Doores, S. (1994). Factors affecting microwave heating of foods and microwave induced destruction of food borne pathogens- A review. *J. Food Prot.*, **57** (11) : 1025-1037.

**Rai, Richa**, Bhattacharyya, D., Dalai, N., Shekhar, S., Praveen, P.K. and Ganguly, S. (2016a) Preparation of chevon meat ball by different cooking methods. *Indian J. Small Rumin.*, **22**(21): 129-130. DOI: 10.5958/0973-9718.2016.00010.6

**Rai, Richa**, Bhattacharyya, Debasish, Praveen, Praveen Kumar, Ganguly, Subha, Dalai, Nirupama and Shekhar, Shashank (2016b) Evaluation of various cooking methods on the nutritional and biochemical attributes and consumer appeal of chevon: A Review. *Internat. J. Sci. Environ. Technol.*, **5**(3): 20-20.

**Raj, R.**, Sahoo, J., Karwasra, R.K. and Hooda, S. (2005). Effect of ginger extract and clove powder as natural preservatives on the quality of microwave oven cooked chevon patties. *J. Food Sci. Technol.*, **42** (4) : 362- 364.

**Tornberg, E.** (2005). Effects of heat on meat proteins on structure and quality of meat products. *Meat Sci.*, **70**:493–508.

**Yilmaz, I.**, Yetim, H. and Ockerman, H.W. (2002). The effect of different cooking procedures on microbiological and chemical quality characteristics of Tekirdag meat balls *Nahrung/Food*, **46** (4) : 276– 278.

**WEBLIOGRAPHY.....**

FAOSTAT (2009). *Food and agriculture organization of the United Nations. FAOSTAT database*, <http://faostat.fao.org>.

